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Dated 27th March 2001

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P01/7700 0.00-0004940.3

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Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form)

The Patent Office

Cardiff Road
Newport
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1. Your reference

BH/P1325

2. Patent application number
(The Patent Office will fill in this part)

02 MAR 2000

0004940.3

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

John Frederick Kemp
The Old Coach House
The Street
Patching
West Sussex BN13 3XF

Patents ADP number *(if you know it)*

7624299001

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

APPARATUS FOR DERIVING ENERGY FROM WAVES

5. Name of your agent *(if you have one)*

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Brian P. Hughes
Brian Hughes & Co
Letterbox Cottage
Friezley Lane
Cranbrook
Kent TN17 2LL

6934673001

Patents ADP number *(if you know it)*

07405001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) any applicant named in part 3 is not an inventor, or
b) there is an inventor who is not named as an applicant, or
c) any named applicant is a corporate body.
See note (d))

No

Title: Apparatus for deriving energy from waves

The present invention relates to an apparatus for deriving energy from waves, particularly waves in the sea.

Devices for deriving energy from sea waves are known. Nearly all of these devices float up and down on the waves and convert this oscillating motion into energy such as electricity. Often a floating body oscillates relative to a shaft, pillar or other object on the sea bed , and the construction needs to be very substantial to cope with the forces produced by the waves.

The invention seeks to derive energy from waves in a different manner by using the forward motion of a wave to compress the air between two wave peaks.

According to the present invention there is provided an apparatus for deriving energy from waves comprising a chamber adapted to float in water but having a water plane area such that its vertical oscillating movement is substantially damped relative to the height of waves in the water in which it is floating, a chamber inlet port at one end of the chamber adapted to face into a wavetrain, a baffle in the chamber, and an outlet port between the inlet port and the baffle,

In use waves travel through the inlet port and compress air in the wave troughs as each wave advances towards and then hits the baffle whereby the compressed air is forced out of the outlet port to provide a source of energy.

Preferably the chamber is an elongate chamber.

The chamber may be formed from a pair of side walls spaced apart by a top plate.

One end of the side walls may be joined by an end wall and the other end of the side walls may be spaced to provide the inlet port.

A bottom plate may span the side walls and the side walls may provide at least part of the bottom of the chamber.

The baffle may be provided adjacent the end wall, or the baffle may be provided by the end wall itself.

The baffle may taper towards the inlet port.

The side walls may form a wave channel. Alternatively the chamber may include a pair of tapering side plates adjacent each side wall to define a wave channel.

The angle of taper of the side plates may be adjustable and they may be curved.

An internal ramp may be provided to form a base for the wave channel.

The angle of the ramp may be adjustable and it may be curved.

Preferably the outlet port is adjacent the baffle and the outlet may be mounted in a top plate.

A wave water outlet may be provided in the chamber and may be adjacent the baffle.

Means may be provided to adjust the buoyancy of the chamber to adjust its height in the water to suit different wave conditions.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings in which:

Figure 1 shows a perspective view,

Figure 2A shows a diagrammatic cross section view of waves in the chamber prior to air being compressed, and

Figure 2B shows a diagrammatic cross section view of waves in the chamber with air compressed.

Referring to Figure 1 there is shown an apparatus for deriving energy from waves. The apparatus has an elongate chamber 1 adapted to float in water. Chamber 1 is formed from a pair of side walls 2A, 2B spaced apart by a top plate 3. One end of the side walls are joined by an end wall 4 and the other end of side walls are spaced to provide an inlet port 5. A bottom plate 6 may span the edges of the side walls opposite the top plate 3.

Chamber 1 includes a pair of internal tapering side plates 7A, 7B (shown in dotted lines) adjacent each side wall 2A, 2B to define a wave channel, and the bottom of the channel may be the plate 6 or an inclined ramp 14.

A baffle 8 is provided adjacent the end wall 4 and tapers towards the inlet port. The tapered sides of the baffle may be curved as shown.

An outlet port 9 is mounted on the top plate 3 to which is attached an airflow pipe 10 connected to a prime mover 11. Outlet port 9 is adjacent the baffle, and between the

baffle and the inlet port. A wave water outlet 12 is provided in the bottom plate 6 adjacent and below the baffle 8.

Referring now to Figures 2A, 2B it will be seen that the chamber 1 may be anchored to the sea bed by anchor and chain 13. The chamber is tethered from the inlet port so that the inlet port always faces the wavetrain.

Buoyancy for the chamber 1 is provided mostly by the side walls 2A, 2B, but also by the end wall 4. The side and end walls have a small water plane area such that the vertical oscillating movement of chamber 1 is substantially damped relative to the height of waves in the water in which it is floating,

In use waves travel through the inlet port and travel along the wave channel created by the side plates 7A, 7B towards the baffle 8. As seen in Figure 2A a cavity Z of air (in the trough behind a peak of wave X hitting the baffle and the following peak of wave Y) is created under the outlet port 9. As wave Y moves towards baffle 8, the air in cavity Z is compressed by the wave Y and forced out through the outlet port 9. Each wave hitting the baffle 8 is reflected normal to the direction of the wave train to disperse the wave energy, and excess water under pressure passes through water outlet 12.

It will be appreciated that the air between any two waves entering the chamber 1 will be compressed and expelled through the aperture 9. The compressed air may be used to drive a prime mover 11 designed to generate energy. A non-return valve (not shown) may be positioned in the pipe 10 to take off air when it reaches maximum compression.

The invention may take a form different to that specifically described above. In particular the apparatus may be adjustable to suit different wave conditions. For example

means may be provided to adjust the buoyancy of the chamber to adjust its height in the water to suit different wave heights, or means may be provided to adjust the angle of taper of the side plates 7A, 7B. It is thought that the taper of the side plates 7A, 7B may help to compress the air to increase the peak pressure of air driven out through the outlet port 9, and adjustment of the taper of plates 7A, 7B may serve to give compression ratios of e.g. between 2:1 to 6:1. The position of baffle 8 may be adjustable along the length of chamber 1, e.g. to suit different wavelengths. The bottom plate 6, or the ramp 14, may also be angled, and possibly adjustable like the side plates, to help compress the air.

Also the apparatus may be of a simpler construction. For example the side walls 2A, 2B may serve as a wave channel guide and the side plates 7A, 7B may not be required. The bottom plate 6 may not be required and the end wall 4 may serve as the baffle instead of there being a separate baffle.

It is envisaged that the apparatus of the invention may be produced in different sizes to suit different types of conditions, e.g. for estuary use or for ocean use. The prime mover 11 may generate electricity. Also two or more such apparatus may be interconnected to supply a single source of compressed air to a prime mover. The prime mover may be positioned on or remote from any chamber 1.

Because the chamber 1 may be anchored to the sea bed, the force on the chamber 1 is greatly reduced compared to hitherto known constructions.

Further modifications will be apparent to those skilled in the art without departing from the scope of the present invention.

CLAIMS

1. Apparatus for deriving energy from waves, the apparatus comprising a chamber adapted to float in water but having a water plane area such that its vertical oscillating movement is substantially damped relative to the height of waves in the water in which it is floating, a chamber inlet port at one end of the chamber adapted to face into a wavetrain, a baffle in the chamber, and an outlet port between the inlet port and the baffle,

2. Apparatus as claimed in claim 1, in which, in use, waves travel through the inlet port and compress air in the wave troughs as each wave advances towards and then hits the baffle whereby the compressed air is forced out of the outlet port to provide a source of energy.

3. Apparatus as claimed in claim 1 or claim 2, in which the chamber is an elongate chamber.

4. Apparatus as claimed in any preceding claim, in which the chamber is formed from a pair of side walls spaced apart by a top plate.

5. Apparatus as claimed in claim 4, in which one end of the side walls is joined by an end wall and the other end of the side walls are spaced to provide the inlet port.

6. Apparatus as claimed in claim 5, in which a bottom plate spans the side walls and the side walls provide at least part of the buoyancy for the chamber.

7. Apparatus as claimed in claim 5 or claim 6, in which the baffle is provided adjacent the end wall.

8. Apparatus as claimed in claim 5 or claim 6, in which or the baffle is provided by the end wall itself.

9. Apparatus as claimed in any preceding claim, in which the baffle tapers towards the inlet port.

10. Apparatus as claimed in any preceding claim, in which the side walls form a wave channel.

11. Apparatus as claimed in any of claims 1 to 9, in which the chamber includes a pair of tapering side plates adjacent each side wall to define a wave channel.

12. Apparatus as claimed in claim 11, in which the angle of taper of the side plates is adjustable.

13. Apparatus as claimed in any preceding, in which an internal ramp is provided to form a base for the wave channel.

14. Apparatus as claimed in claim 13, in which the angle of the ramp is adjustable.

15. Apparatus as claimed in any preceding claim, in which the outlet port is adjacent the baffle and is mounted in a top plate.

16. Apparatus as claimed in any preceding claim, in which a wave water outlet is provided in the chamber adjacent the baffle.

17 Apparatus as claimed in any preceding claim, in which means are provided to adjust the buoyancy of the chamber to adjust its height in the water to suit different wave conditions.

18. Apparatus for deriving energy from waves substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

ABSTRACT

Apparatus for deriving energy from waves, the apparatus comprising a chamber 1 adapted to float in water but having a water plane area such that its vertical oscillating movement is substantially damped relative to the height of waves in the water in which it is floating, a chamber inlet port 5 at one end of the chamber adapted to face into a wavetrain, a baffle 8 in the chamber, and an outlet port 9 between the inlet port 5 and the baffle 8,

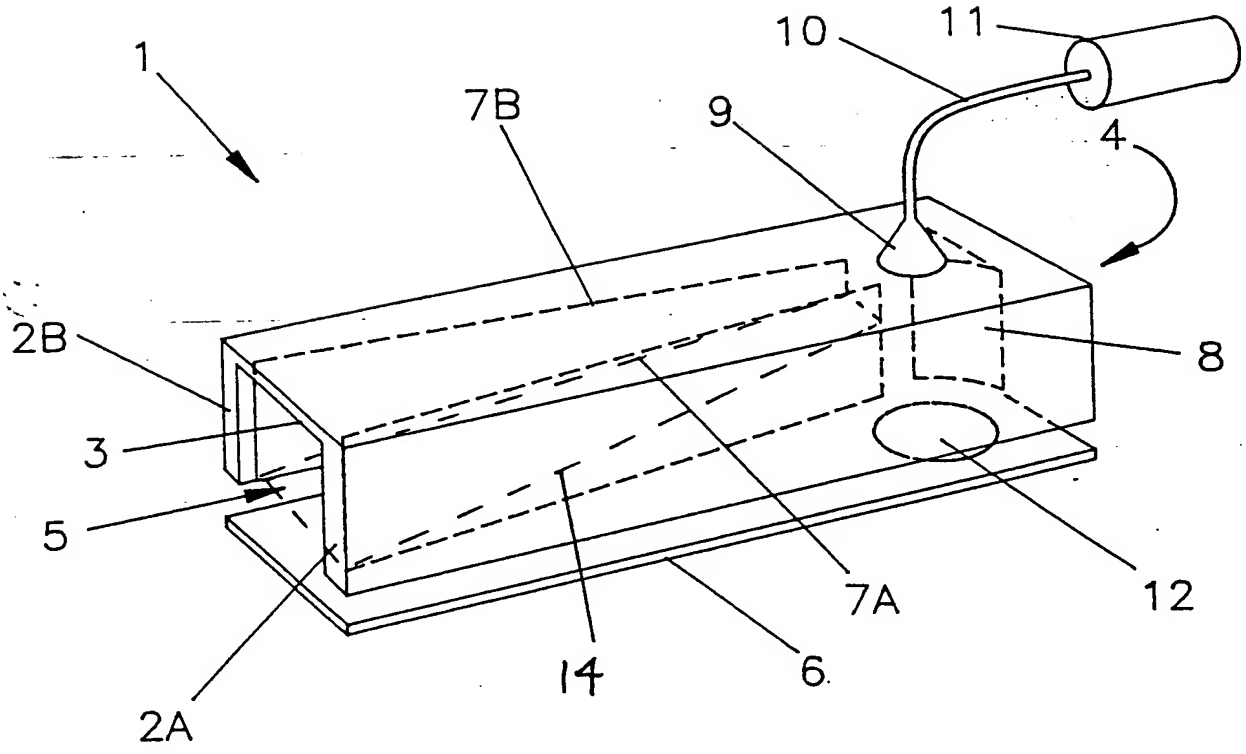

FIGURE 1

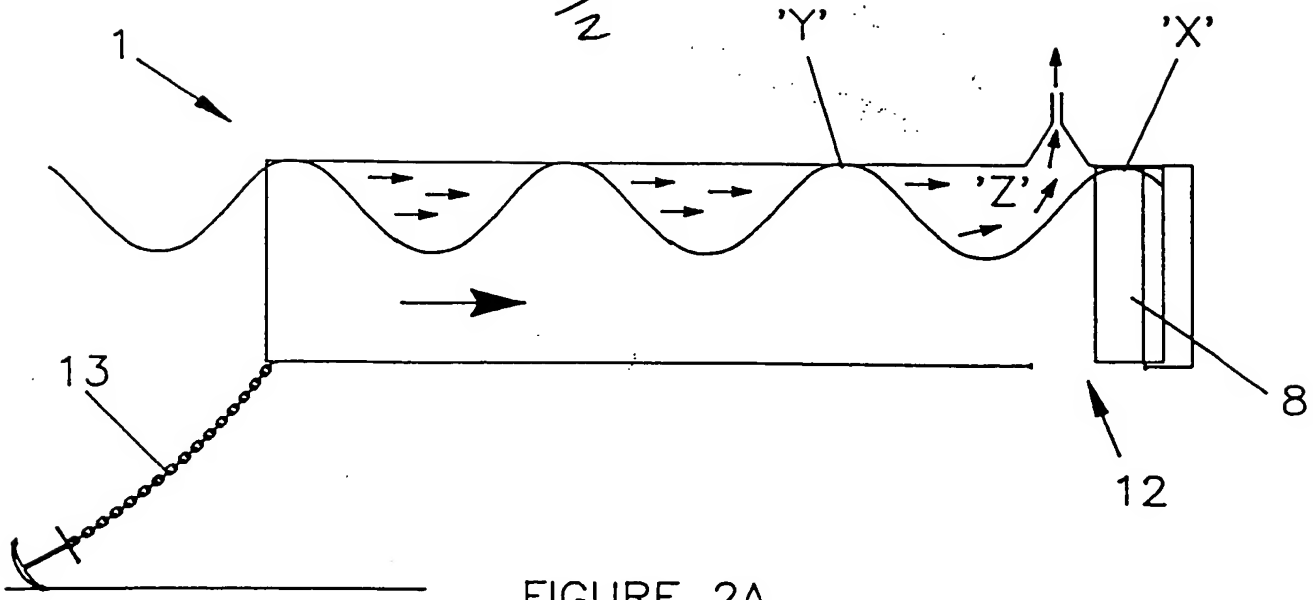

FIGURE 2A

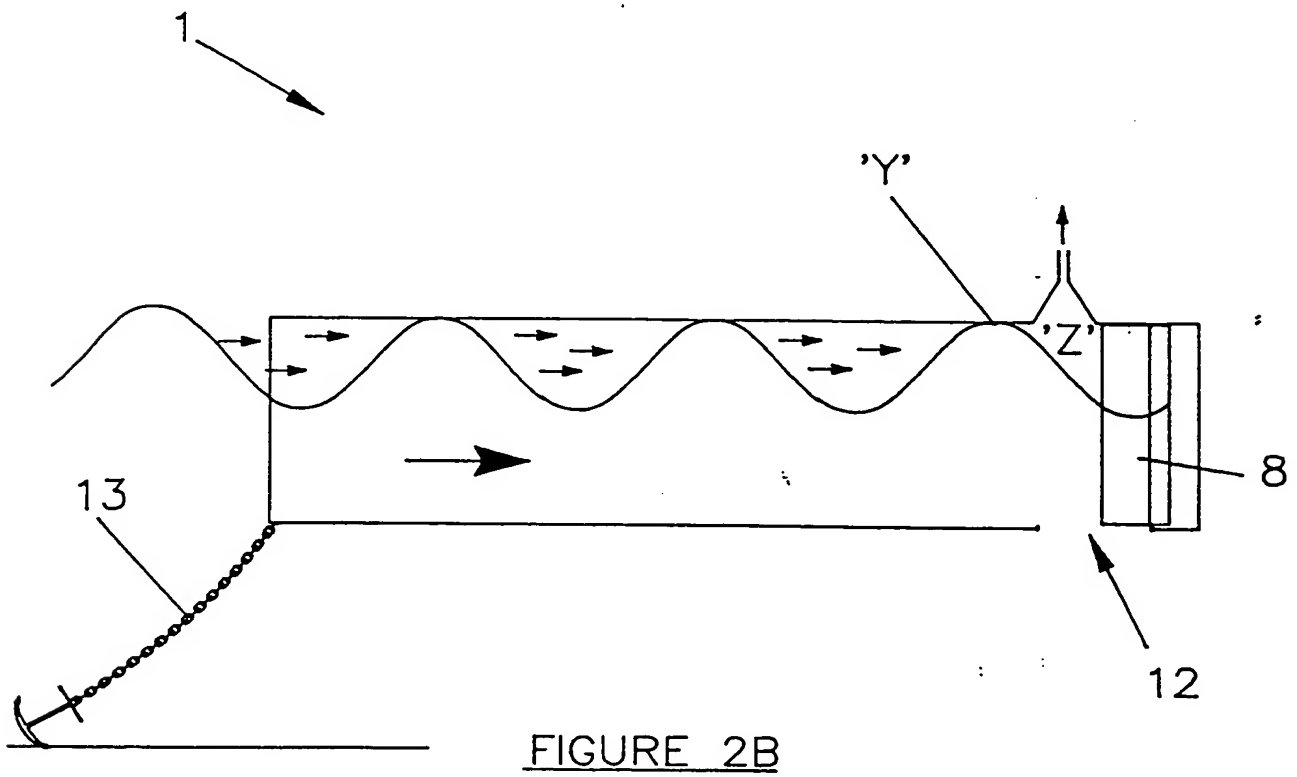

FIGURE 2B